

# Fetal Outcome among Hypertensive Disorders in Pregnant Women with Hyperuricemia

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## ABSTRACT

**Objective:** to determine the frequency of unfavorable fetal outcomes in pregnant women who had hypertensive disorders of pregnancy (HDP) and hyperuricemia.

**Patients and Methods:** A total of 200 pregnant patients of age 18-40 years, attending OPD, ward, labor and emergency having hypertensive disorders having gestational age 24 to 40 weeks were included. Study was conducted from March 20,2020 to December 20, 2020. Patients having serum uric acid > 6.0 mg/dl were considered hyper-uricemic. All patients were followed to till delivery of baby to determine fetal outcomes with included; pre-term birth, still birth, low birth weight and early neonatal death.

**Results:** The mean age was 28.16±5.01years, with gestational age of 35.45±3.21 weeks. Chronic hypertension was observed in 12 (6%), gestational hypertension 44 (22%), mild pre-eclampsia 31 (15.5%), moderate preeclampsia 52 (26%), superimposed pre-eclampsia in 14 (7%) and eclampsia was observed in 47 (23.5%) patients. Preterm was the commonest outcome that was observed in 96 (48%) patients, low birth weight in 70 (35%) patients, still birth in 33 (16.5%) patients and early neonatal death 25 (12.5%) patients.

**Conclusion:** There is a high rate of adverse fetal outcomes in women presenting with HDP having hyperuricemia. So, measurement of serum uric acid concentration seems to be a useful test to predict fetal outcome in this high-risk population.

**Keywords:** Hyperuricemia, Hypertension, Fetal outcomes.

## INTRODUCTION

Acute hypertensive disorders of pregnancy (HDP), which afflict approximately 2 to 10 percent of all pregnancies worldwide, are the most common cause of maternal, perinatal, and neonatal morbidity and mortality.<sup>1, 2</sup> It has been calculated that the estimated incidence of HDP is seven times higher in developing nations when compared to developed countries. The risk of maternal fatalities owing to HDP in low-income countries is 300 times more than the risk in high-income countries.<sup>3, 4</sup> Preeclampsia and eclampsia are believed to be responsible for around 16 percent of global maternal mortality each year (63 000 maternal fatalities), according to recent research.<sup>5</sup> Particularly in underdeveloped countries, HDP is a significant source of fetal and mother morbidity and mortality.<sup>6</sup> Women who have HDP are five times more likely than women who do not have hypertensive disorders of pregnancy to suffer a perinatal mortality.<sup>7</sup>

Uric acid generated as a last consequence of purine breakdown in the liver by endogenous and exogenous precursor proteins is primarily eliminated through the kidneys (65 percent) and intestines (35 percent). Despite the fact that uric acid has high antioxidant action at normal physiologic concentrations, when uric acid concentrations in the blood exceed normal levels, oxidative damage is triggered. An increase in uric acid levels over time is connected with endothelial dysfunction and inflammation, two conditions that are linked together.<sup>8, 9</sup> In the literature, the uric acid threshold values of 6mg/dl (530 units per liter) and 5.6mg/dl (5.6mg per liter) at 38 weeks of pregnancy have been extensively reported, and an average uric acid level of 363 umol /L or higher has been reported to be associated with unfavorable outcomes during pregnancy.<sup>10, 11</sup> The presence of hyperuricemia in the fetal itself has been linked to the development of newborn respiratory distress syndrome.<sup>12</sup> The goal of this study was to determine the frequency of unfavorable fetal outcomes in pregnant women who had HDP and hyperuricemia.

## MATERIAL AND METHODS

A total of 200 pregnant patients of age 18-40 years, attending OPD, ward, labor and emergency having hypertensive disorders having gestational age 24 to 40 weeks were included. Study was conducted from March 20,2020 to December 20, 2020 in Dr. Ruth

K.M. Pfau Civil Hospital Karachi. Patients with previous history of hyperuricemia, preexisting Diabetes mellitus, renal disease, or cardiovascular illness were excluded.

All women were assigned in study after taking informed verbal consent. Detailed history related to patient's age, parity, gestational age, past and present medical & surgical history, and obstetrics history was taken. Thorough general physical examination, vitals, systemic and obstetrics examination was done. Investigations included serum uric acid and Urine Detailed Report. Patients having serum uric acid > 6.0 mg/dl were considered hyper-uricemic. All patients were followed to till delivery of baby to determine fetal outcomes with included; pre-term birth, still birth, low birth weight and early neonatal death. Pre-term birth was labelled if baby was born before 37 weeks of gestation. Still birth was labelled if there was no sign of life after 24 weeks of gestation. LBW was labelled if birth weight of newborn was <2500 grams.

## RESULTS

The mean age was 28.16±5.01years, with gestational age of 35.45±3.21 weeks. Regarding parity, 95 (47.50%) patients were multiparous, 57 (28.5%) were primiparous and 48 (24.0%) were nulliparous (Table 1).

Regarding type of hypertensive disorder, chronic hypertension was observed in 12 (6%), gestational hypertension 44 (22%), mild pre-eclampsia 31 (15.5%), moderate preeclampsia 52 (26%), superimposed pre-eclampsia in 14 (7%) and eclampsia was observed in 47 (23.5%) patients as presented in Figure 1.

Table 1: Baseline Characteristics.

Variables	Value
Age (Years)	28.16±5.01
Gestational age (weeks)	35.45±3.21
Systolic Blood Pressure (mmHg)	156.45±12.99
Diastolic Blood Pressure (mmHg)	106.85±10.82
Parity	
Nulliparous	48 (24.0%)
Primiparous	57 (28.5%)
Multiparous	95 (47.50%)

Frequency of fetal outcome among pregnant women with hypertensive disorders and hyperuricemia are reported in table 2.

Preterm was the commonest outcome that was observed in 96 (48%) patients, low birth weight in 70 (35%) patients, still birth in 33 (16.5%) patients and early neonatal death 25 (12.5%) patients [Table 2].

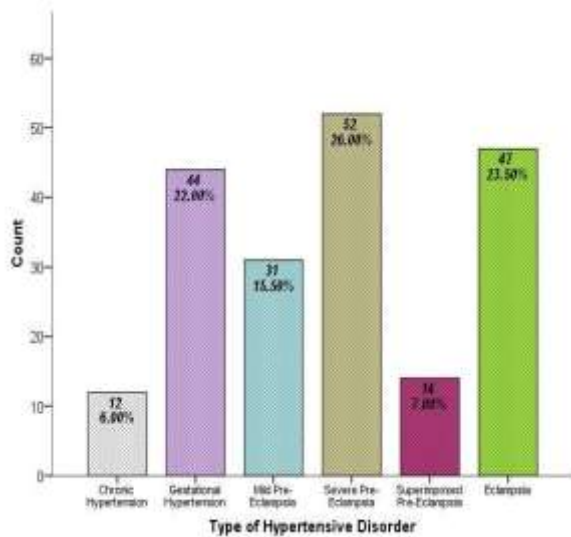


Figure 1: Frequency of Types of HDP.

Table 2: Frequency of Fetal Outcomes.

Fetal Outcome	Frequency
Preterm	96 (48%)
Still Birth	33 (16.5%)
Low Birth Weight	70 (35%)
Early Neonatal Death	25 (12.5%)

**DISCUSSION**

Since HDP prevalence differs by location of the world, it ranges from 1.5 percent to 7.5%.<sup>13</sup> Race, socioeconomic class, and other demographic factors, such as age and parity, can all play a role in the disparity. Since the presence of hyperuricemia isn't usually regarded an aid in diagnosis or treatment, numerous observations have shown that hyperuricemia may be indicative of an elevated risk of preeclampsia.<sup>14</sup>

The presence of hyperuricemia during pregnancy has been found to be significantly connected with poor fetal outcomes, according to research. A increased uric acid concentration during pre-eclampsia causes fetal growth to be reduced because it interferes with amino acid transport in the placenta.<sup>15</sup> It is well known that uric acid stimulates the development of pro-inflammatory chemicals and vasoconstrictors in vascular smooth muscle cells while simultaneously decreasing nitric oxide production and tending to promote the creation of thromboxane in these cells.<sup>16</sup> As a result, hyperuricemia is associated with endothelial dysfunction and elevated blood uric acid levels, both of which are precursors to the development of hypertension. Increased blood uric acid levels in mid-gestation in normotensive pregnant women are associated with insulin resistance and lower birthweights in their offspring.<sup>17</sup>

Redman et al. discovered 25 years ago that preeclampsia patients with high uric acid had a higher risk of fetal death.<sup>18</sup> SGA was also found to be higher in gestationally hypertensive women with both proteinuric and nonproteinuric hyperuricemia in another investigation.<sup>19</sup>

In our study, the average age of the patients was 28.16±5.01years. It is consistent with findings from studies conducted by Jamal et al in Pakistan and Ferraz et al in Brazil showing young maternal age is a risk factor for miscarriage and preterm delivery.<sup>20</sup>

Out of 200 women, chronic hypertension was observed in 6%, gestational hypertension 22%, mild pre-eclampsia 15.5%, moderate re-eclampsia 26%, superimposed pre-eclampsia 7% and eclampsia was observed in 23.5%. Among the cases studied by Anand & Kirshnanand et al. in Bhopal, the majority (66.36 percent) had preeclampsia and the remainder had eclampsia, according to the findings (33.64 percent).<sup>21</sup> As found in the research by Wolde et al. preeclampsia was found to be the most frequent hypertensive condition in pregnancy (51.9 percent), followed by eclampsia (23.4 percent), HELLP syndrome (8.9 percent), mild preeclampsia (7.6 percent), and simple gestational HTN (6.2 percent). Preeclampsia was the most prevalent hypertensive disease during pregnancy (51.9 percent), and eclampsia was the second most common (5.1 percent).<sup>22</sup>

In our study, Preterm was the commonest outcome that was observed in 48% (96/200) while out of 200 cases, Low birth weight was 35%. Our results are comparable with such a study carried out in Dhaka, which showed a high frequency of low birth weight in pre-eclamptics women with hyperuricemia.<sup>23</sup> This finding is lower than that of a study conducted in Chandigarh, which found that 69 percent of patients with hyperuricemia had low birth weight; nevertheless, a study conducted in Argentina found that 10 percent of patients with hyperuricemia had low birth weight, which is lower than this study.<sup>24</sup> Several investigations, including a systematic review, have found a statistically significant link between stillbirth and maternal hypertension.<sup>25</sup> According to Newtonraj et al, maternal hypertension was a contributing factor in 19.4 percent of stillbirths. Several writers have hypothesized that there is a link between high serum uric acid levels and the severity of the eclampsia, as well as perinatal death.<sup>26</sup>

Our results are also supported by Hussain et al. who found IUD in 2 (8.0%) patients and Kondareddy et al., who reported LBW in 72.0% in preeclamptic with hyperuricemia patients.<sup>27, 28</sup> During Stratification analysis it was found that the rate of still birth and early neonatal death was significantly high in women who had above 7.5 mg/dl serum uric acid. According to another study the perinatal mortality rate (PNMR) was 200 per 1000 births in mothers with serum uric acid levels less than 5.5.<sup>29</sup>

**CONCLUSION**

There is a high rate of adverse fetal outcomes in women presenting with HDP having hyperuricemia. So, measurement of serum uric acid concentration seems to be a useful test to predict fetal outcome in this high-risk population.

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